



From: コニカテクノサーチ (株) 国際G 0426+42+9378

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PATENT

Attorney Docket No. 02860.0700

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
Hiroyuki HATTORI et al.)	Group Art Unit: 2872
Serial No.: 10/025,492)	Examiner:
Filed: December 26, 2001)	Arnel. C LAVARIAS
For: OPTICAL ELEMENT AND)	
MANUFACTURING METHOD)	

Commissioner for Patents
Washington, D.C. 20231

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TECHNOLOGY CENTER 2800

DECLARATION

Sir:

1. I, Hiroyuki HATTORI hereby declare and state as follows:

That I have been awarded a Bachelors degree in Strength of Materials of Department of Technology from Sizuoka University in March 1985. Since April 1985, I have been employed by Konica Corporation, the Assignee of the above identified application. During my employment, I have been engaged in the research and development center in the field of Optics.

That I am one of the coinventors of the present application and am familiar with the subject matter of the present invention. I have read and understood the Office Action of August 7, 2003.

2. What follows is my statement as an expert to explain the molded optical element according to the present invention and the molding process according to

Meyers.

3. The molded optical element according to the present invention

As recited in claim 1 and shown in Fig. 1 of the present application, an optical element of the present invention is molded between a first die 11 and a second die 12 which are jointed along a partition line.

The molded optical element comprises:

a first optical surface 1a on which a diffractive structure 1c is provided;

a second optical surface 2a being a refractive surface opposite to the first optical surface; and

a flange 1b having a flange surface provided around a periphery of the optical element, a first edge portion of the flange surface adjoining to the first optical surface and a second edge portion of the flange surface adjoining to the second optical surface.

The optical element has an optical axis and the flange surface is parallel to the optical axis, and the second edge portion of the flange surface is positioned at the partition line between the first die and the second die.

With the above configuration, when the first die and the second are parted, the separation is firstly occurred on the refractive surface and is not occurred on the diffractive surface as shown in Fig. 3.

Accordingly, the microscopic stepped structure of the diffractive surface 1c formed on the first optical surface is not influenced or is not deformed by a possible positional displacement caused in the vertical

direction to the shifting direction of the die when the first die and the second are parted.

4. The molding process according to Meyers

Fig. 24 of Meyers shows a die arrangement in which a lens is molded between a die 20 and a die 30. Figs. A1 to A4 and Fig. B are made on the basis of Fig. 24 in order to explain the molding process according to Meyers.

As shown in Fig. A-1, since the die 20 is provided with an injection port and a sprue, the die 20 is structured as a fixed die and the die 30 is structured as a shiftable die.

In this mold arrangement, (1) an optical material is injected from a port 21 of the die 20 through the sprue S.

(2) After the optical material hardened, the dies 20 and 30 are parted by shifting the die 30. At this time, a molded lens 40 and a bar-shaped portion 50 corresponding to the sprue S are shifted together with the die 30 and removed from the die 20 as shown in Fig. A-2. The bar-shaped portion 50 is usually tapered so as to be removed easily from the die 20.

(3) Thereafter, by pulling the bar-shaped portion 50 with a gripper, the molded lens 40 and the bar-shaped portion 50 are removed from the die 30 as shown in Fig. A-3.

(4) Finally, the molded lens 40 is cut out from the bar-shaped portion 50 as shown in Fig. A-4.

In contrast to the above process, there may be considered the following process that, when the dies 20

and 30 are parted by shifting the die 30, the molded lens 40 and the bar-shaped portion 50 remain on the die 20 as shown in Fig. B. However, in this process, the left side of each of the molded lens 40 and the bar-shaped portion 50 is not provided with a protruded portion to be grasped with a gripper, it may be difficult to remove the molded lens 40 and the bar-shaped portion 50 from the die 20.

Therefore, in this process, it may be difficult to conduct automatically the removing process to remove the molded lens 40 and the bar-shaped portion 50 from the die 20 with the automated device. Consequently, the process shown in Fig. B is not adopted as a practical process.

5. Conclusion

As can be understood from the above explanation, in Meyers, when the dies 20 and 30 are parted, the separation is firstly occurred on the diffractive surface S2. Therefore, in Meyers, there is no concept to provide an edge portion of a flange surface adjoining the refractive surface at the partition line between dies so as to conduct the separation firstly on the refractive surface.

6. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001, of Title 18 of the United

States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

Dated:

September 29, 2003

Hiroyuki Hattori
Hiroyuki HATTORI

Attachment

Figs. 1 and 3 of the present application

Figs. A1 to A-4 and Fig. B which were made on the basis of Fig. 24 of Meyers